

## **SECTION 07220**

### **ROOF DECK AND INSULATION**

#### **PART 1 - GENERAL**

##### **1.1 DESCRIPTION**

- A. Provide all labor, equipment, and materials to install roof insulation over the properly prepared deck substrate.

##### **1.2 RELATED SECTIONS**

- A. Related work specified elsewhere:
1. Section 07550 "Modified Bitumen Built-up Roofing."
  2. Section 07600 "Flashing and Sheet Metal."

##### **1.3 REFERENCES**

ASTM A-167-94a	Specification for Stainless and Heat-Resisting Chromium Nickel Steel Plate, Sheet and Strip
ASTM A-653	Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process
ASTM B-29	Pig Lead
ASTM B-32	Solder Metal
ASTM C-165-95	Test Method for Measuring Compressive Properties of Thermal Insulation
ASTM C-208-95	Specifications for Cellulosic Fiber Insulating Board
ASTM C-209-92	Test Method for Cellulosic Fiber Insulating Board
ASTM C-272-91	Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions
ASTM C-518-91	Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
ASTM D-5	Test Method for Penetration of Bituminous Materials
ASTM D-36	Test Method for Softening Point of Bitumen (Ring and Ball Apparatus)
ASTM D-312	Specification for Asphalt Used in Roofing

ASTM D-412-92	Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension
ASTM D-1621-94	Test Method for Compressive Properties of Rigid Cellular Plastics
ASTM D-1622	Test Method for Apparent Density of Rigid Cellular Plastics
ASTM D-1863	Specification for Mineral Aggregate Used on Built-Up Roofs
ASTM D-2126-94	Test Method for Response off Rigid Cellular Plastics to Thermal Humid Aging
ASTM D-2178	Standard Specification for Asphalt Glass Felts used in Roofing and Waterproofing
ASTM D-4601-94	Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing
ASTM D-5147	Sampling and Testing Modified Bituminous Sheet Material
CISPI	Cast Iron Soil Pipe Institute, Washington, D.C.
NRCA	National Roofing Contractors Association, Chicago, IL
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SDI	Steel Deck Institute, St. Louis, Missouri
SPIB	Southern Pine Inspection Bureau, Pensacola, Florida
FS HH-I-1972	Insulation Board, Polyisocyanurate
FS LLL-1-535B	Insulation Board, Thermal (Fiberboard)

#### 1.4 SUBMITTALS

- A. Product Data: Provide manufacturer's specification data sheets for each product.
- B. Provide approval letters from insulation manufacturer for use of their insulation within this particular roofing system type.
- C. Provide a sample of each insulation type.
- D. Certification
  1. Submit roof manufacturer's certification that insulation adhesive furnished is acceptable to roof manufacturer.

2. Submit roof manufacturer's certification that insulation furnished is acceptable to roofing manufacturer as a component of roofing system and is eligible for roof manufacturer's system warranty.

## **1.5 DELIVERY, STORAGE AND HANDLING**

- A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry and undamaged.
- B. Store all insulation materials in a manner to protect them from the wind, sun and moisture damage prior to and during installation. Any insulation that has been exposed to any moisture shall be removed from the project site.
- C. Keep materials enclosed in a water tight, ventilated enclosure (i.e. tarpaulins).
- D. Store materials off the ground. Any warped, broken or wet insulation boards shall be removed from the site.

## **1.6 QUALITY ASSURANCE**

- A. Fire Classification, ASTM E-108
- B. Submit certification that the roof system furnished meets local or nationally recognized building codes for fire Class A and/or wind resistance.

# **PART 2 - PRODUCTS**

## **2.1 APPROVED EQUIVALENT**

- A. Contractor must submit any product not specified a minimum five days before the bid date to Engineer in order for product to be considered for approval. The Engineer will notify Contractor in writing of decision to accept or reject request.

## **2.2 INSULATION MATERIALS**

- A. Provide thicknesses of insulation as indicated, provide combination of types and thicknesses to provide a complete system.
  1. Rigid Polyisocyanurate Roof Insulation

- a. Qualities: Rigid, closed cell polyisocyanurate foam core bonded to heavy-duty glass fiber mat facers.
  1. Thickness: 3 in.
  2. R-Value: Minimum 18.5
  3. Board Size: 4' x 8'
- b. Source
  1. E'NRG'Y-2 By NRG Barriers, Inc.
  2. Ultra Gard Gold II by Schuller Roofing Systems
  3. GAFTEMP Isotherm R by GAF
  4. Approved Equivalent
- c. Insulation board shall meet the following requirements
  1. UL, WH or FM listed under Roofing Systems
  2. Federal Specification HH-I-1972, Class 1
- d. Physical Properties
 

Dimensional Stability	ASTM D-2126	2% max.
Compressive Strength	ASTM D-1621	25 psi min.
Vapor Permeability	ASTM E-96	1 perm max.
Foam Core Density	ASTM D-1622	2.0 pcf min.
Water Absorption	ASTM C-209	<1%
R-Factor	HR per inch	
Thickness	ASTM C-518	5.6 (Design Value)

#### 4. Tapered Polyisocyanurate Roof Insulation (drain sumps only)

- a. Qualities: Factory Tapered, closed cell polyisocyanurate foam core bonded to heavy-duty glass fiber mat facers.
  1. Taper Thickness: Minimum 1 in. at low points.
  2. Tapered Slope: 1/4 in. per foot.
  3. Average R-Value: Minimum 10.0.
- b. Source
  1. E'NRG'Y-2 by NRG Barriers, Inc.
  2. Ultra Gard Gold II by Schuller Roofing Systems
  3. GAFTEMP Isotherm R by GAF
  4. Approved Equivalent

- c. Insulation board shall meet the following requirements
  - 1. FM listed under Roofing Systems
  - 2. Federal Specification HH-I-1972, Class 1
- 3. High Density Fiberboard Roof Insulation
  - a. Qualities: Rigid, composed of interlocking fibers factory blended treated with asphalt on the topside.
    - 1. Board Size: 4' x 4'
    - 2. Thickness: Minimum ½ in.
  - b. Source
    - 1. Celotex
    - 2. Temple Inland
    - 3. GAF Building Materials Corporation
    - 4. Approved Equivalent
  - c. Insulation board shall meet the following requirements
    - 1. FM listed under Roofing Systems.
    - 2. Federal Specification LLL-I-535-B.

d. Physical Properties

1.	Dry Density	ASTM C-208	17.5 pcf.
2.	Compressive Strength	ASTM C-165	45
psi min.			
3.	Linear Expansion	ASTM C-208,209	0.5%
max.			
4.	Foam Core Density	ASTM C-1622	2.0
pcf min.			
5.	Water Absorption	ASTM C-208	10%
max.			
6.	R-Factor HR per inch	ASTM C-518	2.5
(Design Value)	Thickness		

## 2.3 RELATED MATERIALS

- A. Fiber Cant and Tapered Edge Strips: Performed rigid insulation units of sizes/shapes indicated, matching insulation board or of perlite or organic fiberboard, as per the approved manufacturer.
1. Acceptable Manufacturers
- The Garland Company, Inc.
  - Celotex
  - Johns-Manville Roofing Systems
  - International Permalite, Inc.
  - Approved Equivalent
- B. Protection Board: Pre-molded semi-rigid asphalt composition board ½ in.
- C. Roof Board Joint Tape: 6" wide glass fiber mat with adhesive compatible with insulation board facers.
- E. Single component insulation adhesive suitable for a concrete deck.
1. Performance Requirements:
- Tensile Strength (ASTM D-412-92 ).... 250 psi
  - Density (ASTM D-1875-90) ..... 8.5 lbs/gal
  - Viscosity (ASTM D-2556-93a)..... 2,000-60,000 cP
  - Peel Strength (ASTM D-903) .....17 lb/in
  - Flexibility (ASTM D-816-12) ..... Pass @ -70°F

## PART 3 - EXECUTION

### 3.1 INSPECTION OF SURFACES

- A. Roofing contractor shall be responsible for preparing an adequate substrate to receive insulation.
1. Verify that work, which penetrates roof deck, has been completed.
  2. Verify that wood nailers are properly and securely installed.
  3. Examine surfaces for defects, rough spots, ridges, depressions, foreign material, moisture, and unevenness.
  4. Do not proceed until defects are corrected.
  5. Do not apply insulation until substrate is sufficiently dry.
  6. Broom clean substrate immediately prior to application.
  7. Use additional insulation to fill depressions and low spots that would otherwise cause ponding water.
  8. Verify that temporary roof has been completed.

### **3.2 INSTALLATION**

- A. Attachment with Insulation Adhesive
1. On a prepared deck, approved by the manufacturer, install 3" insulation boards adhered to the deck in ribbons of adhesive at the rate to obtain an FM 1-90. Install insulation boards to the deck in ribbons of adhesive at the rate of one [1] gallon per 150 square feet. Do not allow the adhesive to skin over. Briefly step each board into place to ensure contact with the adhesive.
  2. Applying adhesive directly to the substrate in a ribbon pattern in 1/2" (1.27 cm) to 3/4" (1.91 cm) beads, using either the pail or an automatic applicator, placed every one 1' foot (0.30 m) on center to achieve proper coverage rates. Immediately place - do not slide - the insulation boards into the wet adhesive. Do not allow the adhesive to skin over. Briefly step each board into place to ensure contact with the adhesive.
  3. Approved recovery board 1/2" thickness shall be installed over base insulation in insulation adhesive at the rate of one [1] gallon per 150 square feet. Do not allow the adhesive to skin over. Briefly step each board into place to ensure contact with the adhesive.
  4. All boards shall be cut and fitted where the roof deck intersects a vertical surface. The boards shall be cut to fit a minimum of 1/4" away from the vertical surface.

### **3.3 CLEANING**

- A. Remove debris and cartons from roof deck. Leave insulation clean and dry, ready to receive roofing membrane.

## **PART IV - MEASUREMENT AND PAYMENT**

### **4.1 MEASUREMENT**

- A. Roofing insulation including both the 3" iso layer and the ½" protection board layer plus all associated adhesives, roofing plys, cleaning, preparation and fastening systems shall be measured on a square foot basis complete and in place. All associated costs in connection with roofing insulation shall be considered incidental to that pay item.

### **4.2 PAYMENT**

- B. Roofing insulation shall be made at the Contract Unit Price per square foot.

### **4.3 PAYMENT ITEMS**

<u>Item No.</u>	<u>Description</u>	<u>Unit</u>
0212.151	Roofing Insulation	SF

**END OF SECTION**